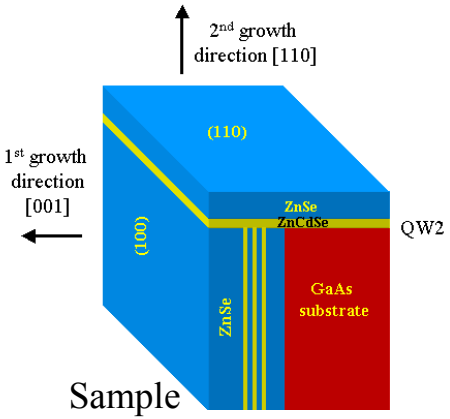
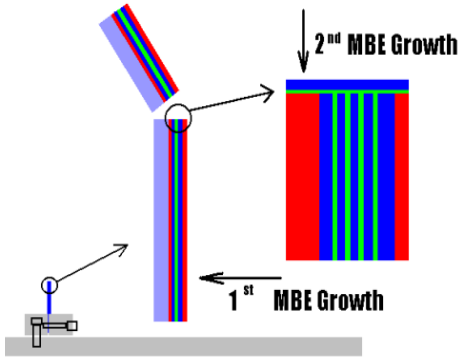
# Formation of semiconductor quantum wires by cleaved-edge overgrowth

M. Dobrowolska, University of Notre Dame, DMR-0245227

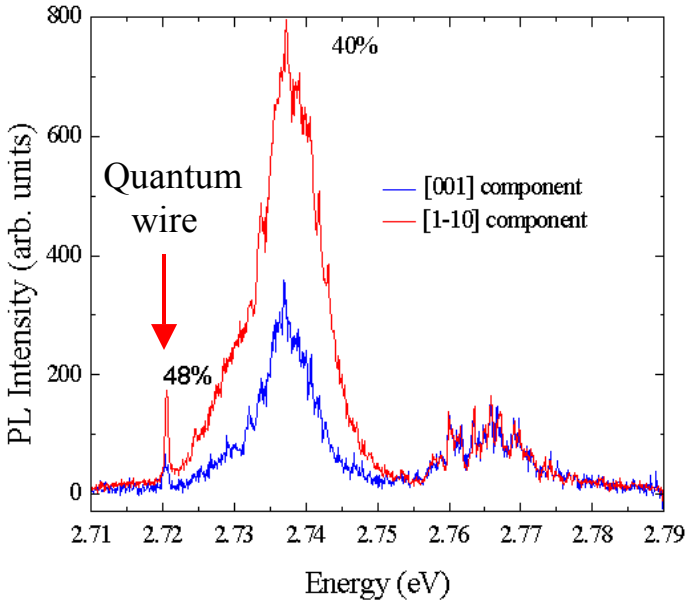
We have begun the study of semiconductor quantum structures formed by cleaved-edge overgrowth (CEO). This method offers the possibility of depositing epitaxial layers on a surface that has not been contaminated by exposure to the atmosphere, thus opening a new situation for growth dynamics; and CEO of multiple quantum wells can also be used to form structures of dimensionality lower than 2. We use intersecting ZnCdSe quantum wells in a ZnSe barrier matrix. Micro-photoluminescence (PL) spectra from a 2-μm spot show a single, very narrow spike (FWHM of 0.5 meV) which is strongly linearly polarized. Such strong linear polarization of PL from a nanostructure indicates that this line corresponds to a quantum wire formed by the "T-junction" of intersecting quantum wells.




Sample




CEO method



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**Education:**

Personnel involved in our semiconductor nanostructure program:

- One Undergraduate Student
- Three Graduate Students
- One Foreign Exchange Student
- Two Post-docs
- One Senior Fulbright Visitor
- Two Short-Term Faculty Visitors

**Outreach:**

In addition to fabrication of semiconductor nanostructures and their optical studies, our group has acted as *a materials resource* for other institutions. In the past two years we have provided semiconductor quantum structures, including systems involving ferromagnetic semiconductors (e.g., GaMnAs), to collaborators in *nine* U.S. Universities, *three* Undergraduate Colleges, *five* National or Government Laboratories, and *six* Universities overseas.